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QUALITY CONTROL REPORT



***AirTOXIC-CALIB 5U GC 866 with internal PC
#25860222***

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FINAL CUSTOMER or DISTRIBUTOR**Order N°: PO-0766 dated of the 25th of January 2022****Society: We Care 4 Air Ltd****Final customer: SCOTTISH EPA****Name of the contact: Mrs Vanessa AMBLER****Phone: +441279730029****Fax: ...****Portable: ...****Address: Unit C Bridgeworks, Hall Green, Little Hallingbury, Bishops Stortford, Hertfordshire, CM22 7 RP, UNITED KINGDOM****E-Mail: vanessa@wecare4air.com****1 APPLICATION**

Application: BTEX, Cyclohexane and Styrene analysis in ambient air

2 ANALYSER CONFIGURATION**2.1 airTOXIC-CALIB A73022 general characteristics****Analytical column:** MXT 30 CE, film thickness: 1 µm, id: 0.28 mm, length: 30 m**SN: 1649990****Detector:** PID**Temperature setting:** 150 °C**Lamp ignition:** 200µA**Lamp SN:** V505**Clean lamp:** yes**Carrier gas:** Nitrogen (Nitroxichrom #35870222)**Critical orifice:** 50 µm**Frit:** NO**Sampling loop:** NO**Injection valve:** 6 ports, 1/8"**Pneumatic:** YES**Electric:** NO**Relay used:** Relay8/Valve6**TRAP Adsorbant:** 2 phases C6**Impedance filament:** 4.1Ω**Heating:** 380°C (Ref: --- Ω)**U₁₀₋₁** = 157mV**Piezo valve:** No**Pk Card:** 1.5 Bars calibrated at 1024 hPa and 23°C

Information | General | Sampling | Precolumn | Column | Detector |

Analyzer

Serial Number: #25860222 Type: VOC1010

Instrument sensitivity

Base Sensitivity: 29702.00

Comments

Location: SCOTLAND

Owner: SCOTTISH EPA

Setup file version

Version: 7 Release: 1

Last update

Date: 16:21 21/02/2022

Manufacturer access - CHROMATOTEC RealTime DataBase

Information | General | Sampling | Precolumn | Column | Detector |

Instrument mode

Instrument in: Semi-Master mode

Baud rate

9600 19200

Additional communication protocol

Protocol: None Results in: GC Unit/SamplingVol.

Method parameters

Calibration method: CALIB30M Zero method: Method in: two cycles

Security heaters settings

Maximum Temperature: 202.0 °C Heating time at maximum power: 900.0 s

Manufacturer access - CHROMATOTEC RealTime DataBase

2.2 Software and computer**VistaCHROM Software:** 1.58**Microprocessor:** 7.1**Port COM:** COM 3**Others:** Driver M/JBUS**COM Port:** COM 5**Auto-calibration option:** YES**Nitroxichrom:** #35870222**COM Port:** COM 7

USER	SCOTTISH ENVIRONMENT PROTECTION AGENCY
COMPANY	SCOTTISH ENVIRONMENT PROTECTION AGENCY
LICENSE	VC1-1F8C-014E-57

License valid until: Full registration**GCCPU-220202213**

2.3 Internal calibration

Pressure Inlet (from yes #35870222): 3 Bars

Temperature setting: 40°C (± 0.2 °C)

Pressure regulator outlet of the internal calibrator N2 supply: ≈ 0.4 Bar

Used relay to control the standard gas selection and the dilution flow: Relay7/Valve5 & Valve3 of POWER BOARD

Tube: BENZENE SN 20220114-I789

Permeation tube rate: 10.6 ng/min @ 40°C (±10%)

Flowrate of N2 on permeation oven:

- ❖ **Permanent flow:** 49.00 ml/min (RELAY 7/VALVE 5 & VALVE 3: OFF)
- ❖ **Total dilution:** 247.10 ml/min (RELAY 7/VALVE 5 & VALVE 3: ON)

Concentration needed:

Concentration in µg/m³ =	$\frac{\text{Permeation rate in ng/min}}{\text{Total dilution flow in l/min}}$
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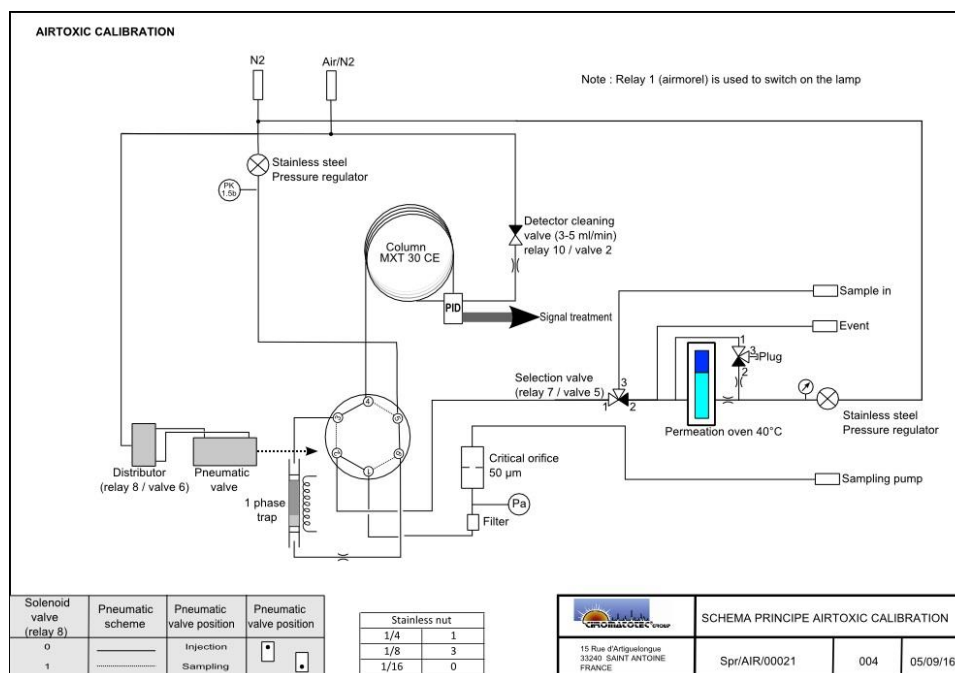
- **(Concentration in µg / m³ x 24.04) / Mol weight = Concentration in ppb (with a molar volume of 24.04 l at 20 °C)**

Total dilution flow in ml/min:

247.1

Permeation oven temperature setting	Permeation tube characteristics	Benzene 20220114-I789
40°C Using temperature	Permeation rate in ng/min	10.57
	Precision in %	10%
	Precision in ng/min	1.06
	Concentration in µg/m3	42.91
	Precision in µg/m3	4.29
	Concentration in ppb at 20 °C	13.21
	Precision in ppb	1.32

2.4 Pneumatic Scheme



2.5 Peripheral

❖ Pump

Sampling Pump SN: 2.17479523
(-923 hPa)

Flowrate: -17.6 ml/min
(PC: 1008 hPa)

PA Board calibrated at 1024 hPa & 23°C
(ΔP=16 hPa)

❖ Gas generation

Nitroxchrom: yes #35870222

GASES	He (5.5)	H ₂ (5.6)	N ₂ (#35870222)			Ar (6.0)	Zero Air	
Inlet pressure	-----	-----	3 Bars			-----	-----Bars	
Operating pressure	-----	-----	Carrier gas	Clean lamp	Permeation oven	-----	Clean lamp	Permeation oven
			0.87 Bar	3 Bar	≈ 0.4 Bar		----- Bar	≈ -----Bar
Flowrate (ml/min)	-----	-----	Carrier gas	Clean lamp	Permeation oven	-----	Clean lamp	Permeation oven
			≈ 3-4	≈ 3.6	49.00 or 247.10		≈ -----	-----

❖ Multiplexing systems

- Not applicable

❖ Configuration relays

For the airTOXIC-CALIB (model A73022), the used relays are:

- **Relay 1** (airmoREL BOARD): used to control the lamp ignition.
- **Valve 2** (POWER BOARD): used to control the clean air of the lamp area.
- **Valve 3** (POWER BOARD): used to control the internal standard gas dilution.
- **RELAY 7/VALVE 5** (POWER BOARD): used to control the sample or internal standard gas selection.
- **RELAY 8/VALVE 6** (POWER BOARD): used to control the injection valve (2 positions).
- **Relay 9:** used to adjust the signal value at the beginning of the cycle with the sequence lamp.cpt. It is the **automatic adjustment of the baseline signal (Auto-Offset option)**.

3 Analyser Calibration

3.1 Experimental procedure for analyser calibration

Temperature of the standard gas: **40°C** - Room temperature around 23°C. Total standard gas flow: 247.10 ml/min.

Sampling method used: **CALIB30M.mth**

Sampling duration **360 seconds**. Thermal-desorption at **380°C** during **240 seconds**.

Amplification of the electrometer: **MIDDLE (Amplification 2)** Cycle duration: **30 minutes** – Acquisition duration **740 seconds**.

3.2 Standard for analyser calibration

Permeation tube of BENZENE #20220114-I789 at 10.6 ng/min @ 40°C (±10%)

- Standard BENZENE: 13.21 ppb or 42.91 µg/m³ (±10%) at 20 °C (molar volume 24.04 l)

3.3 Standard used for retention times and response factors

Sampling method used: **CALIB360.mth**

Sampling duration **360 seconds**. Thermal-desorption at **380°C** during **240 seconds**.

Amplification of the electrometer: **MIDDLE (Amplification 2)** Cycle duration: **30 minutes** – Acquisition duration **740 seconds**.

Substances of standard list

Substance	Concentration in external permeation oven (ppm)
BENZENE	0.0129
TOLUENE	0.0081
ETHYLBENZENE	0.00588
M&P-XYLENES	0.00423
O-XYLENE	0.00581

4 SEQUENCES AND METHODES

Sequence		Method			
Name	Application	Name	Repetition	Application	Substance table
AMB-30MN.cpt	BTX in 30 minutes with one calibration every 7h30	BTX-30MN	1	Ambient air 22.5 mins	BTX-30MN
		CALIB30M	1	Internal STD during 360 s	CAL-30MN
		BTX-30MN	13	Ambient air 22.5 mins	BTX-30MN
		BLANK-30	0	No sampling	BTX-30MN
AMB-15MN.cpt	BTX in 15 minutes with one calibration every 7h15	BTX-15MN	1	Ambient air during 10 min	BTX-15MN
		CALIB15M	1	Internal STD during 360 s	CAL-15MN
		BTX-15MN	27	Ambient air during 10 min	BTX-15MN
		BLANK-15	0	No sampling	BTX-15MN
CALIB-2.cpt	Automatic calibration using internal standard	CALIB360	0	External STD during 360 s	BTX-30MN
		BTX-30MN	0	Ambient air 22.5 mins	BTX-30MN
		CALIB30M	6	Internal STD during 360 s	CAL-30MN
		BTX-30MN	3	Ambient air 22.5 mins	BTX-30MN
DRIFT-30.cpt	Drift 30 mn	BTX-30MN	1	Ambient air 22.5 mins	BTX-30MN
		CALIB30M	1	Internal STD during 360 s	CAL-30MN
		BTX-30MN	10	Ambient air 22.5 mins	BTX-30MN
		BLANK-30	0	No sampling	BTX-30MN
DRIFT-15.cpt	Drift 15 mn	BTX-15MN	1	Ambient air during 10 min	BTX-15MN
		CALIB15M	1	Internal STD during 360 s	CAL-15MN
		BTX-15MN	22	Ambient air during 10 min	BTX-15MN
		BLANK-15	0	No sampling	BTX-15MN
		CALIB360	0	External STD during 360 s	BTX-30MN

5 SUBSTANCES TABLES

BTX-30MN.stbl					
Substance Name	RT Min	RT Max	Select Peak Mode	GC Result formula	With X=
BENZENE	101	111	Middle	X	Area/BS
CYCLOHEXANE	111	121	Middle	$3.8 \times X^{0.88}$	Area/BS
TOLUENE	393	403	Middle	$1.6 \times X^{0.88}$	Area/BS
ETHYLBENZENE	610	620	Middle	$2 \times X^{0.88}$	Area/BS
M&P-XYLENES	624	634	Middle	$1.8 \times X^{0.81}$	Area/BS
STYRENE	651	661	Middle	$2.4 \times X^{0.78}$	Area/BS
O-XYLENE	661	671	Middle	$2 \times X^{0.84}$	Area/BS

Substances table used with **BTX-30MN.mth** method, using **MIDDLE amplification of the electrometer (amplification 2)**

The factors introduced in the "GC Result formula" field are the corrective linearization formula in comparison with the reference compound (BENZENE) with a **calibration method using Middle Amplification of the electrometer (amplification 2)**.

CAL-30MN.stbl					
Substance Name	RT Min	RT Max	Select Peak Mode	GC Result formula	With X=
BENZENE-STD	101	111	Middle	$X / (0.0457 \times (\text{SampleVol}))$	Area
BENZENE	101	111	Sum	$1.1 \times X^{0.9}$	Area/BS

6 TEST CHROMATOGRAMS

6.1 Calibration and stability tests

❖ Base Sensitivity measurement

Parameters	BENZENE	BENZENE-STD
PEAK AREA	--	--
Minimum (au)	144270	144270
Maximum (au)	147266	147266
Measurement number	6	6
Average (au)	146345	146345
Std. deviation (au)	1128.21	1128.21
Rel. std. deviation (%)	0.77	0.77
SAMPLING VOLUME	--	--
Minimum (ml)	106.962	106.962
Maximum (ml)	108.155	108.155
Measurement number	6	6
Average (ml)	107.774	107.774
Std. deviation (ml)	0.56	0.56
Rel. std. deviation (%)	0.52	0.52
SAMPLED WEIGHT	--	--
Std. Comp. Concentration (ppm)	0.01	0.01
Comp. Molecular Weight (a.m.u)	78.11	78.11
Sampled mass (ng)	4.626	4.927
Base sensitivity	31636.25	29702.55
Experimental factor	0.939	1
RETENTION TIME	--	--
Minimum (s)	99	104.9
Maximum (s)	99	105.4
Measurement number	6	6
Average (s)	99	105.2
Standard deviation (s)	0	0.203
Rel. Std. deviation (%)	0	0.19

The « Base Sensitivity » is calculated for the BENZENE at 20 °C using the MIDDLE amplification of the electrometer (Amplification 2). In this example, the « BS » calculated for the BENZENE is **29702.55** a.u/ng with the middle amplification (amplification2).

Relative standard deviation on area: 0.77%

Standard deviation on retention time: 0.203 s

Relative standard deviation on retention time: 0.19%

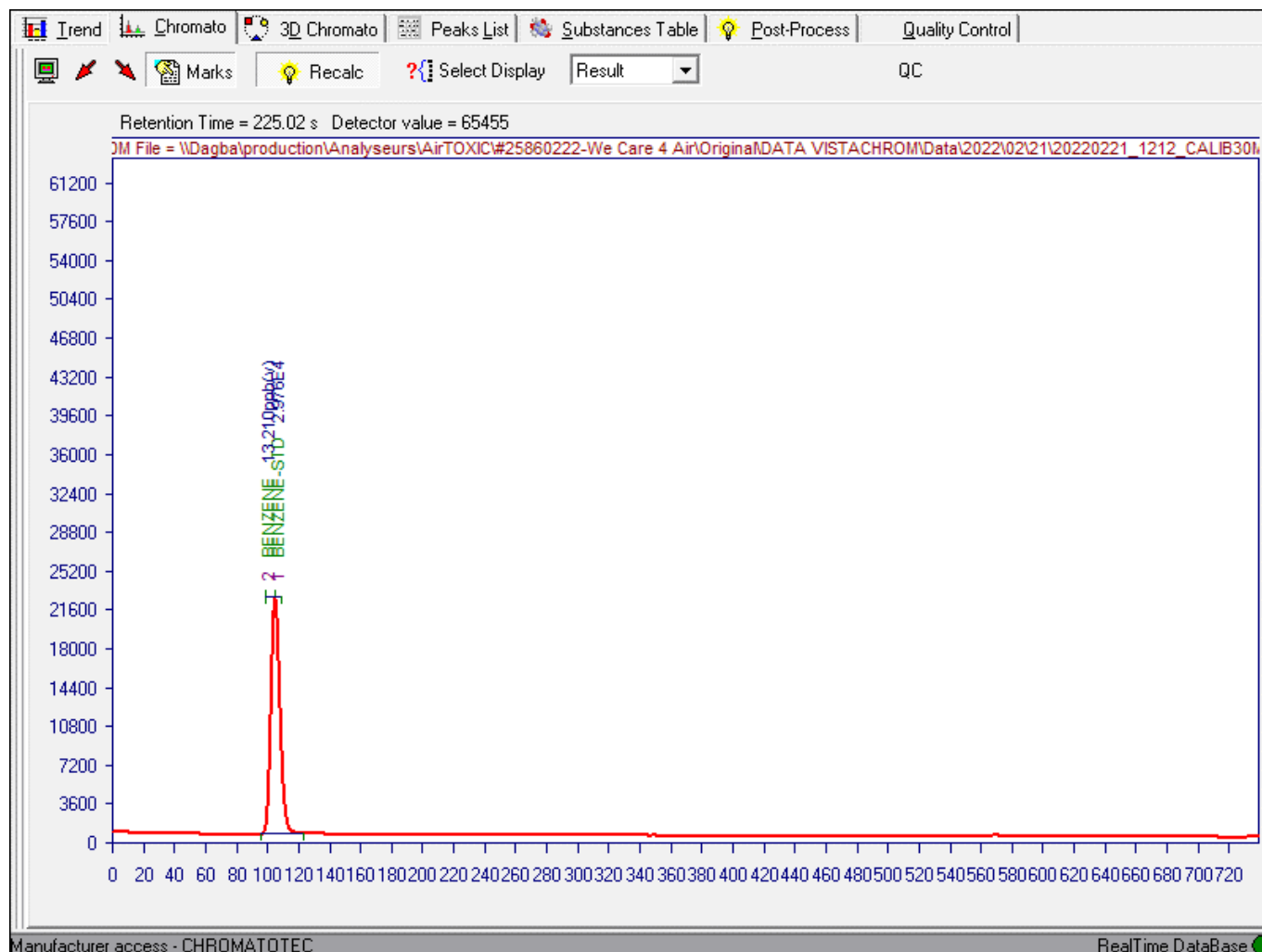
This original « BS » value is 29702 a.u./ng to have a results precision better than $\pm 1\%$ for the internal standard gas.

This « BS » is introduced in the analyser configuration file when it is in "STAND BY" mode, the 21st of February.

6.1.1 Internal Calib

Program used: **CALIB30M**.mth with Middle amplification (amplification 2)

Permeation tube of Benzene (SN 20220114-I789) with permeation rate of **10.6** ng/min @ 40°C (±10%)



Information and operating conditions

Analyzer :

Serial Number : #25860222
Owner : SCOTTISH EPA
Location : SCOTLAND

Operation conditions :

Description : Internal STD during 360 s
Method Name : CALIB30M
Substance Table Name : CAL-30MN

Sampling :

Duration : 360 s
Volume : 108.155 ml
Date : 21/02/2022 12:12:48

Detection :

Amplification : 2-Middle
Date : 25 per second

Base sensitivity : 29702

Peaks List

Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
BENZENE-STD	29760.5	---	95.8	104.92	22965	123.56	147129	ST_E	6.16
BENZENE	13.213	ppb(v)	99	99	22965	109	147129	Peaks sum	---

Precision of the measurement for:

Substance	Precisions of measurement	Concentration in internal permeation oven (ppm)	Result	Unit
BENZENE	0.02%	0.01321	13.213	ppb(v)
BENZENE-STD	---	0.01407	29760.5	---

Internal permeation oven containing:

- **BENZENE: 13.21 ppb or 42.91 mg/m³ (±10%)**

Calculation at **20 °C** (molar volume 24.04 l/mol)

Temperature of the standard gas: **40°C**.

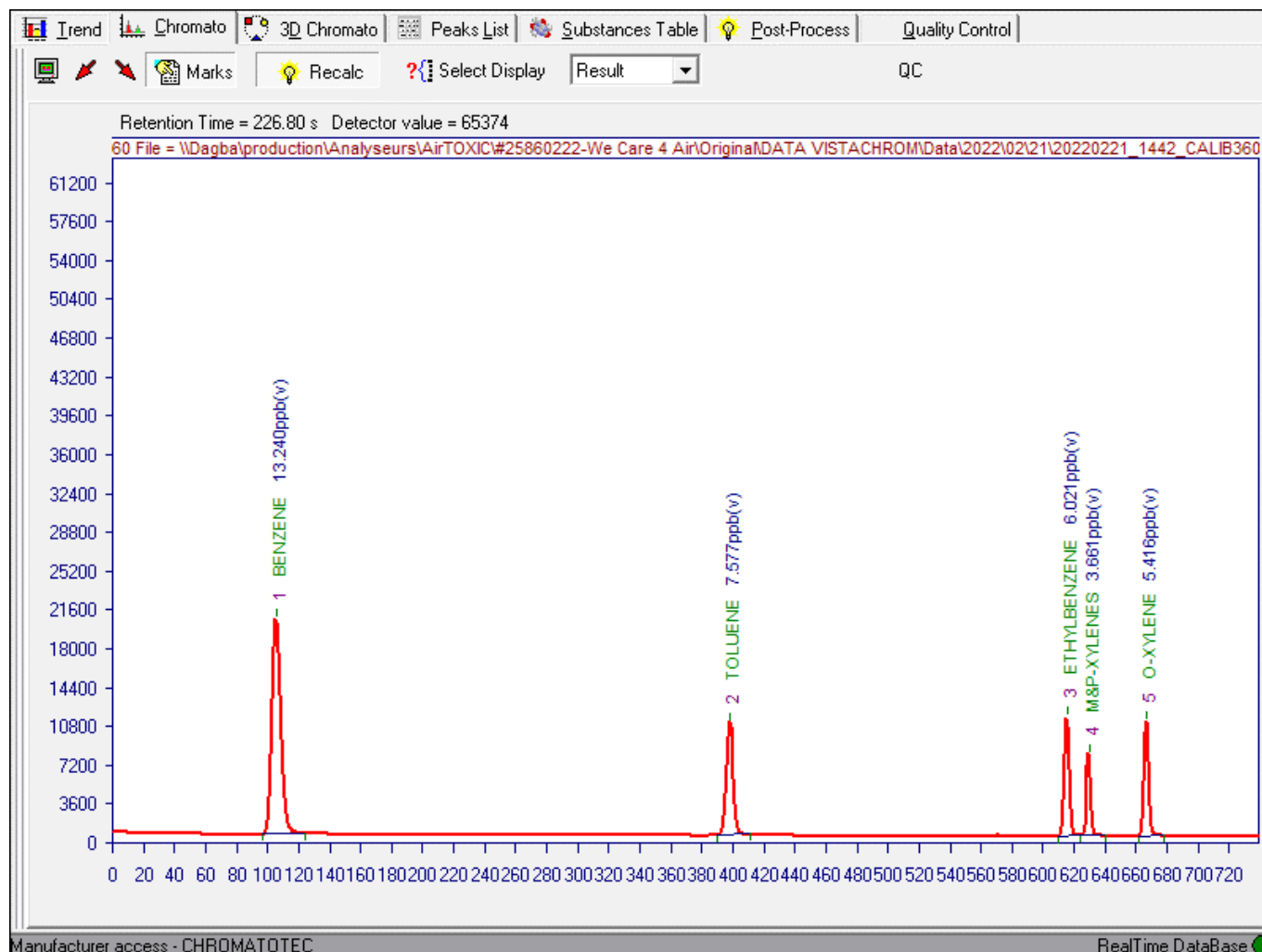
Total standard gas flow: **247.10 ml/min**.

Chromatogram re-processed with "BS"= 29702 a.u/ng with Middle amplification of the electrometer (amplification 2) and re-identified with substances table CAL-30MN.stbl.

« BS » obtained during the calibration of the analyser the 21st of February.

6.1.2 External Calib

Program used: CALIB360.mth with MIDDLE amplification (amplification 2)



Information and operating conditions

Analyzer :

Serial Number : #25860222
 Owner : SCOTTISH EPA
 Location : SCOTLAND

Operation conditions :

Description : External STD during 360 s
 Method Name : CALIB360
 Substance Table Name : BTX-30MN

Sampling :

Duration : 360 s
 Volume : 106.002 ml
 Date : 21/02/2022 14:42:48

Detection :

Amplification : 2-Middle
 Date : 25 per second

Base sensitivity : 29507.7

Peaks List

Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
BENZENE	13.243	ppb(v)	96.44	105.44	21243	124.32	134584	ST_E	6.12
TOLUENE	7.577	ppb(v)	389.56	398.28	11555	411.64	62074.6	ST_E	5.4
ETHYLBENZENE	6.021	ppb(v)	609.36	615.4	12085	624.24	43581.8	ST_E	3.6
M&P-XYLENES	3.661	ppb(v)	624.24	629.88	8584	639.96	27776.2	ST_E	3.28
O-XYLENE	5.416	ppb(v)	661.16	666.72	11723	678.16	39139.3	ST_E	3.24

Precision of the measurement for:

Substance	Precisions of measurement	Concentration in external permeation oven (ppm)	Result	Unit
BENZENE	2.66%	0.0129	13.243	ppb(v)
TOLUENE	-6.45%	0.0081	7.577	ppb(v)
ETHYLBENZENE	2.40%	0.00588	6.021	ppb(v)
M&P-XYLENES	-13.45%	0.00423	3.661	ppb(v)
O-XYLENE	-6.78%	0.00581	5.416	ppb(v)

Precision of the standard gas: **±10%**

Calculation at **20 °C** (molar volume 24.04 l/mol)

Ambient temperature **23°C**.

Total standard gas flow: **259.2 ml/min**.

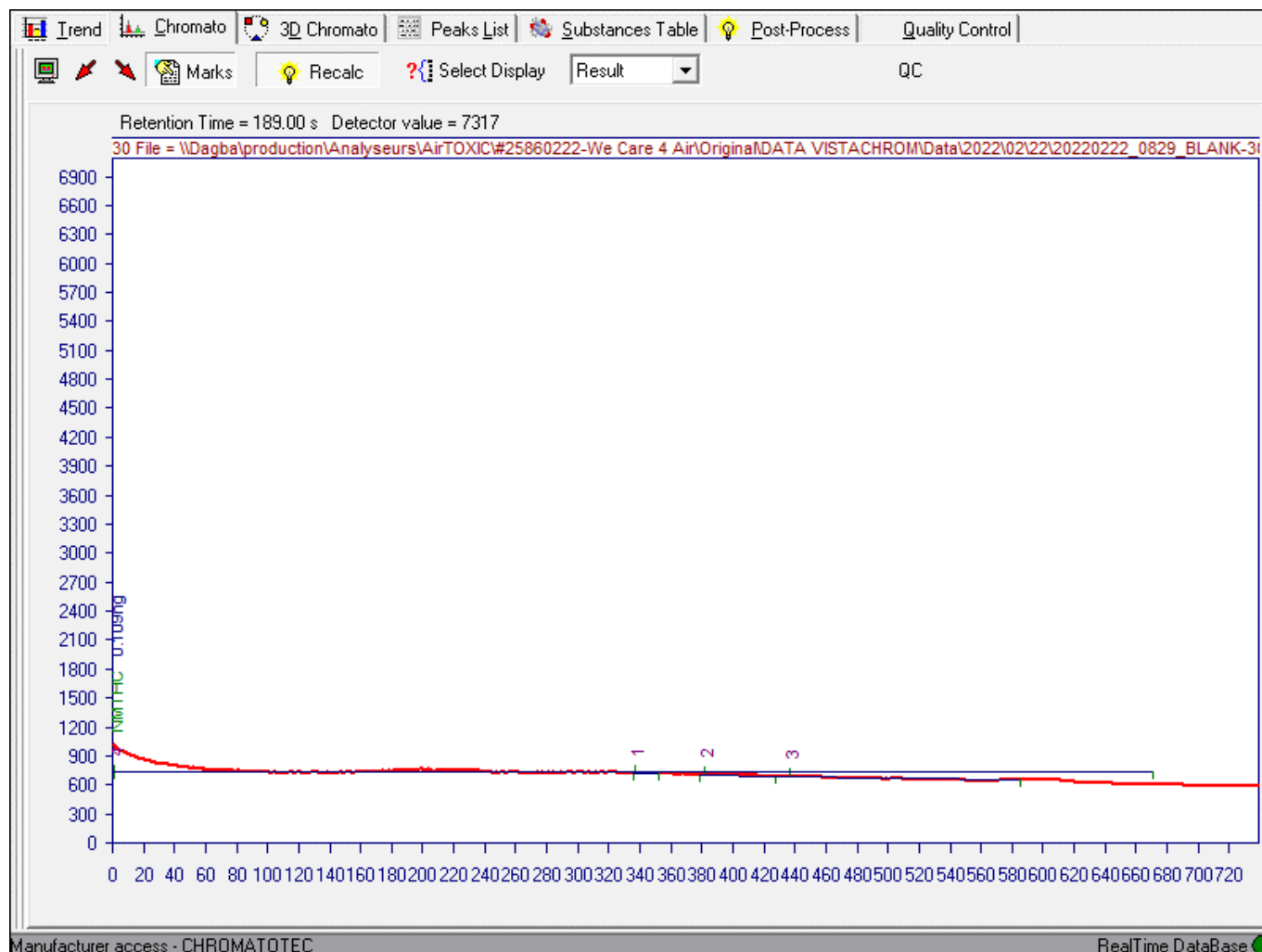
Chromatogram automatically processed with BS=**29507.70** a.u/ng (« BS » obtained with auto calibration option activated using Middle amplification of the electrometer) and identified with substances table BTX-30MN.stbl using MIDDLE amplification of the electrometer (amplification 2).

Results precision better than **±13.4%** for all compounds contained in the external standard gas.

6.1.3 Trap blank analysis

Used program: BLANK-30.mth - Signal amplification: Middle (amplification 2)

Sampling duration: **no sampling** – Cycle duration : **30 minutes** – Acquisition duration : **740 seconds**



Information and operating conditions

Analyzer :

Serial Number : #25860222
Owner : SCOTTISH EPA
Location : SCOTLAND

Operation conditions :

Description : No sampling
Method Name : BLANK-30
Substance Table Name : BTX-30MN

Sampling :

Duration : 1349 s
Volume : 405.439 ml
Date : 22/02/2022 08:29:18

Detection :

Amplification : 2-Middle
Date : 25 per second

Base sensitivity : 28609.6

Peaks List

Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
NMTHC	0.109	ng	1	1	749	671	3119.4	Peaks sum	---

Zoom of the chromatogram: 10% of the total scale.

Chromatogram automatically processed with BS= **28609.60** a.u./ng (« BS » obtained with auto calibration option activated using Middle amplification of the electrometer) and re-identified with substances table CALC-30.stbl using MIDDLE amplification of the electrometer in this method.

NMTHC-EqC3 = 0.109 ng < 1 ng

6.1.4 Zero gas analysis

Used program: BTX-30MN.mth - Signal amplification: Middle (amplification 2)



Information and operating conditions

Analyzer :

Serial Number : #25860222
Owner : SCOTTISH EPA
Location : SCOTLAND

Operation conditions :

Description : Ambient air 22.5 mins
Method Name : BTX-30MN
Substance Table Name : BTX-30MN

Sampling :

Duration : 1349 s
Volume : 394.69 ml
Date : 23/02/2022 13:29:18

Detection :

Amplification : 2-Middle
Date : 25 per second
Base sensitivity : 26301.3

Peaks List

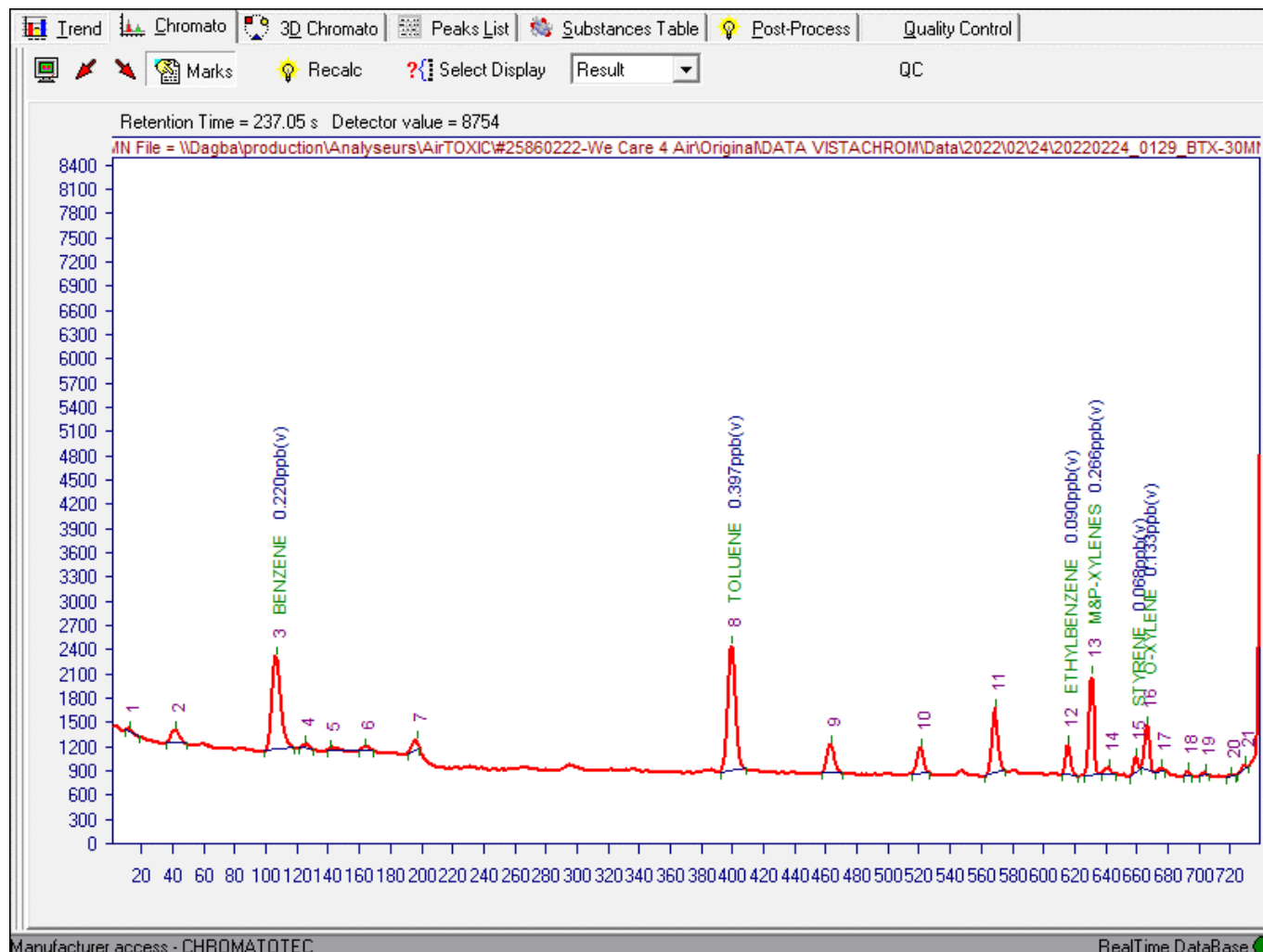
Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
BENZENE	0.118	ppb(v)	103.4	110	1889	119.04	3996.4	ST_E	5.8
O-XYLENE	0.025	ppb(v)	660.28	665.04	1007	667.04	277.2	ST_E	4.36

Zoom of the chromatogram: 10% of the total scale.

Chromatogram automatically processed with BS= **26301.30** a.u/ng (« BS » obtained with auto calibration option activated using Middle amplification of the electrometer) and identified with substances table BTX-30MN.stbl using MIDDLE amplification of the electrometer in this method.

6.2 Ambient air analysis

Program used: BTX-30MN.mth – with MIDDLE amplification (amplification 2)



Information and operating conditions

Analyzer :
 Serial Number : #25860222
 Owner : SCOTTISH EPA
 Location : SCOTLAND

Operation conditions :
 Description : Ambient air 22.5 mins
 Method Name : BTX-30MN
 Substance Table Name : BTX-30MN

Sampling :
 Duration : 1348 s
 Volume : 392.932 ml
 Date : 24/02/2022 01:29:18

Detection :
 Amplification : 2-Middle
 Date : 25 per second

Base sensitivity : 27633.5

Peaks List

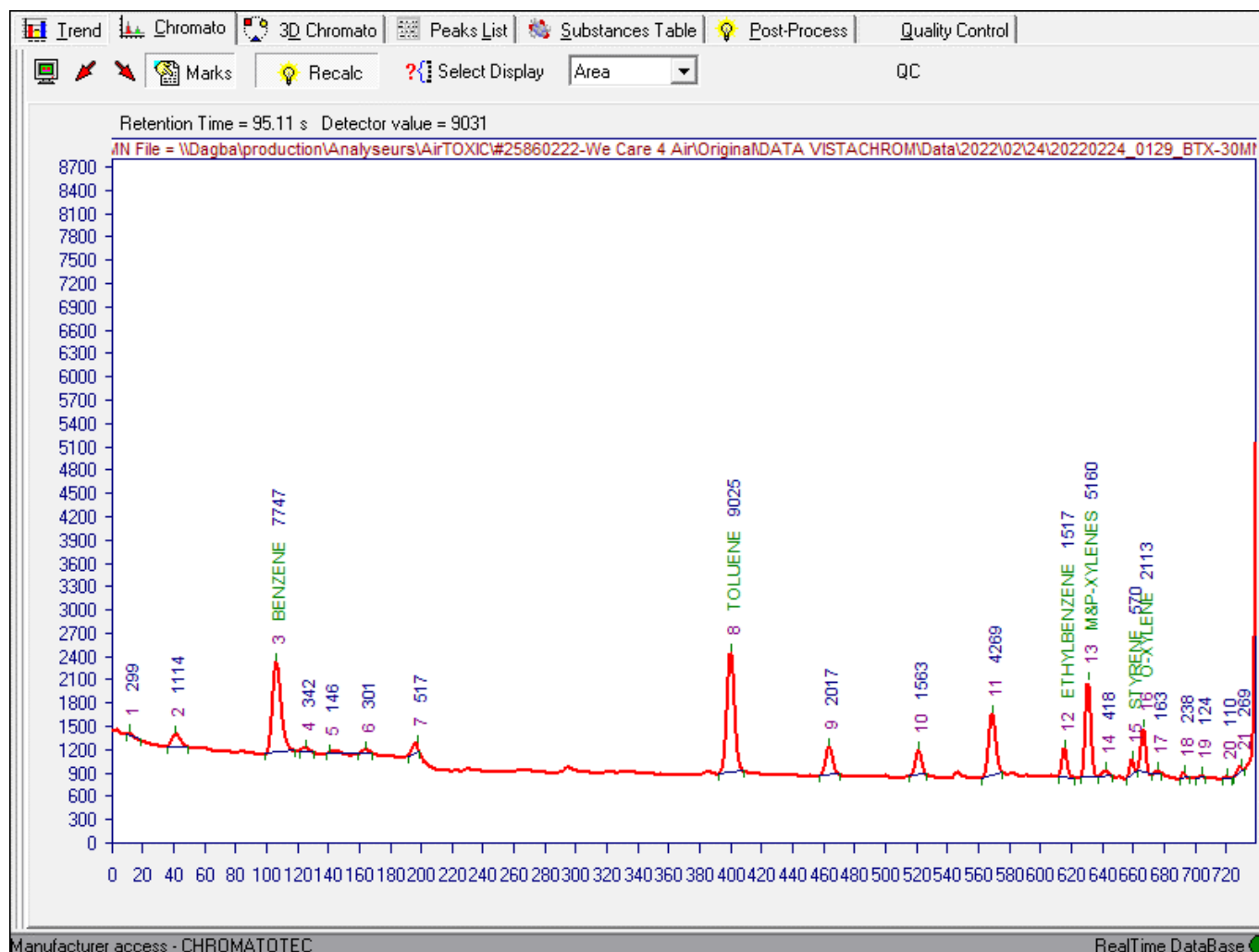
Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
BENZENE	0.22	ppb(v)	99.24	106.6	2369	118.04	7746.9	ST_E	6
TOLUENE	0.397	ppb(v)	392.36	400	2500	408.44	9024.6	ST_E	5.36
ETHYLBENZENE	0.09	ppb(v)	611.68	616	1266	622.2	1517.1	ST_E	3.36
M&P-XYLENES	0.266	ppb(v)	625.88	630.92	2124	636.96	5159.9	ST_E	3.88
STYRENE	0.068	ppb(v)	655.96	659.96	1112	662.5	570.3	ST_E	3.56
O-XYLENE	0.133	ppb(v)	662.5	667.12	1513	672.12	2112.5	ST_E	3.24

Chromatogram is zoomed at 10 % of the total scale.

Chromatogram automatically processed with BS=27633.50 a.u/ng (« BS » obtained with auto calibration option activated using Middle amplification of the electrometer) and automatically identified with substances table BTX-30MN.stbl.

❖ Limit of Quantification (LOQ)

Program used: BTX-30MN.mth – with MIDDLE amplification (amplification 2)

**Information and operating conditions**

Analyzer :
 Serial Number : #25860222
 Owner : SCOTTISH EPA
 Location : SCOTLAND

Operation conditions :
 Description : Ambient air 22.5 mins
 Method Name : BTX-30MN
 Substance Table Name : BTX-30MN

Sampling :
 Duration : 1348 s
 Volume : 392.932 ml
 Date : 24/02/2022 01:29:18

Detection :
 Amplification : 2-Middle
 Date : 25 per second
 Base sensitivity : 27633.5

Peaks List

Substance	Result	Unit	Start (s)	R.Time (s)	Max	Stop (s)	Area	Type	FWHM
BENZENE	223.331	ppt(v)	99.24	106.6	2369	118.04	7746.9	ST_E	6
TOLUENE	403.597	ppt(v)	392.36	400	2500	408.44	9024.6	ST_E	5.36
ETHYLBENZENE	91.162	ppt(v)	611.68	616	1266	622.2	1517.1	ST_E	3.36
M&P-XYLENES	270.963	ppt(v)	625.88	630.92	2124	636.96	5159.9	ST_E	3.88
STYRENE	69.494	ppt(v)	655.96	659.96	1112	662.5	570.3	ST_E	3.56
O-XYLENE	135.214	ppt(v)	662.5	667.12	1513	672.12	2112.5	ST_E	3.24

LOQ for a given BS:

To calculate the LOQ value, a chromatogram of ambient air was printed in area unit.

The minimum area in the program is 100 a.u (below this value, the peaks are not recognized).

The Benzene peak area is 7746.9 a.u corresponding to 223.331 ppt – Therefore the lower detection limit for this instrument is:

$$\frac{100 \times 223.331}{7746.9} \approx \mathbf{2.9 \text{ ppt}} \text{ (or } 0.0094 \mu\text{g/m}^3\text{)} \quad (\text{LOQ})$$

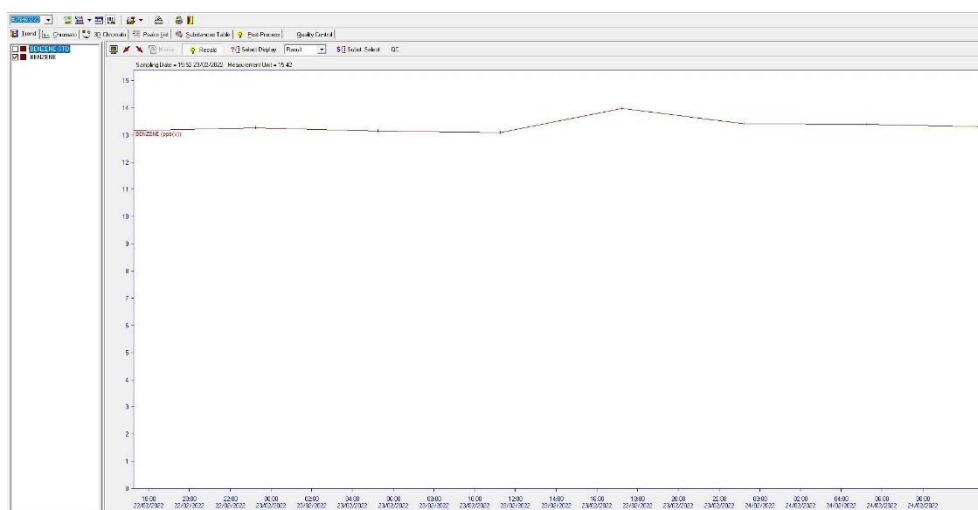
The operating conditions are:

- Amplification: MIDDLE (amplification 2) – Electrometer (version 2).
- Cycle duration: 30 minutes – Sampling duration 1348 seconds (volume sampled measured of 392.932 ml).
- The "BS" used for reprocessing is **27633.50** a.u/ng (Amplification 2).

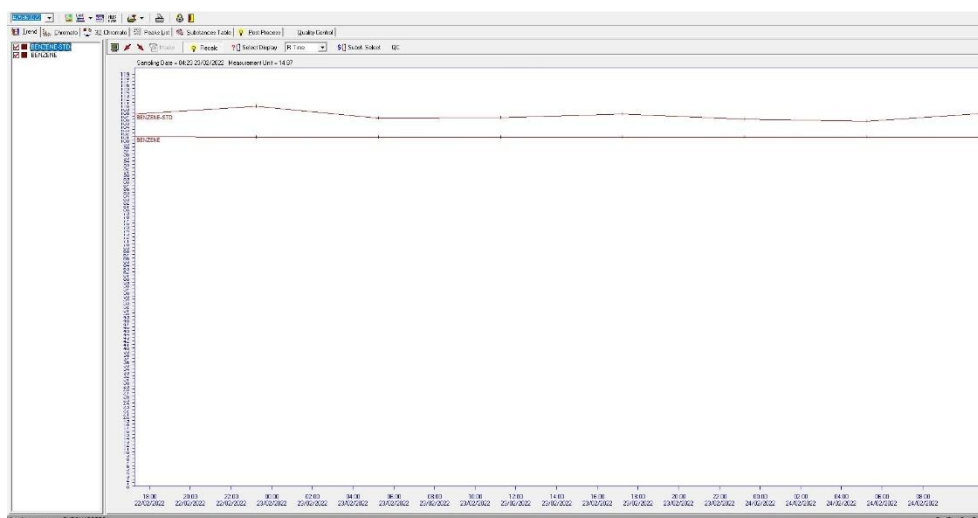
The chromatogram is zoomed at around 10% of the total scale.

6.3 Repeatability result on the internal standard gas

Sequence: Drift-30MN with one calibration each 6 hours (CALIB30M.mth) – with MIDDLE amplification (amplification 2) during 42 hours (24 hours minimum)



Trend of results in ppb – auto calibration activated



Retention time (in seconds)

Sampling date	Volume sampled in ml	BENZENE-STD in a.u/ng	BENZENE in ppb(v)	BENZENE Retention time in s
22/02/2022 17:15	108.4	27508	13.17	107.56
22/02/2022 23:15	108.39	27219	13.28	110.04
23/02/2022 05:15	108.22	26971	13.18	106.6
23/02/2022 11:15	108.11	26301	13.11	106.64
23/02/2022 17:15	107.43	27591	14.01	107.72
23/02/2022 23:15	107.3	27633	13.44	106.28
24/02/2022 05:15	107.14	27631	13.43	105.64
24/02/2022 11:15	107.48	27413	13.33	108.04
Mean	107.809	27283.375	13.369	107.315
Standard deviation	0.522	458.531	0.286	1.364
Relative standard deviation in % (Repeatability)	0.48%	1.68%	2.14%	1.27%
Number of measurements	8	8	8	8
Period in hours	42.00			

6.4 Lamp drift calculation

Calculation example of lamp drift by 24 hours with sequence Drift-30MN.cpt:

23/02/2022 05:15: BENZENE BS = 133419.4 24/02/2022 05:15: BENZENE BS = 135312.4
 $100 \times (135312.4 - 133419.4) / 133419.4 = 1.42\%$ which corresponds to **1.4% of lamp drift in 24 hours.**

6.5 Calculation for long term accuracy - and short-term accuracy

The calculation of short-term accuracy is made from the 6 values of the internal calibration and the result must not exceed 3%.

The calculation of long-term accuracy is made from all the values of the Repeatability result on the internal standard gas and the result must not exceed 6%.

$$\text{Formula: } x = \frac{\Delta \text{ max of benzene results compare from the average of results } (C^{\circ})}{\text{average of the results } (C^{\circ})} * 100$$

7 Criteria acceptabilityModel: **airTOXIC CALIB A73022**Power supply: **230 VAC**Serial number: **#25860222**

Parameter	Measured Value	Acceptable value
Base Sensitivity BS	29702	Between 17000 and 50000 au/ng (Amplification 2)
Accuracy (short-term) of results for the standard benzene	0.49%	≤ 3%
Accuracy (long-term) of results for the standard benzene	4.80%	≤ 6%
Precision of results for others compounds	13.45%	≤ 20%
Head column pressure	0.87 bar	1.0 ± 0.3 bars
Retention time on benzene	____ s (15 mins) 106 s (30 mins)	RTmin = 50s < RT < RTmax= 70s (method 15MN) RTmin = 90s < RT < RTmax= 135s (method 30MN)
RSD on retention time of benzene standard during calibration (6 measurements)	0.19% 0.203 s	< 0.5% < 2s
Minimum area	100 a.u	100 a.u
LOQ: Limit of quantification	2.9 ppt	< 20 ppt
RSD on peak area of benzene standard during calibration (6 measurements)	0.77%	≤ 5%
Long-term noise on (90s) for method 15MN (185s) for method 30MN	30	< 100 signal amplitude
Short-term noise (20s)	12	< 15 signal amplitude
Signal amplification	2 (Middle)	Included between minimum area and saturation limit of signal (1, 2 or 3)
Lamp drift on BS in 24h	1.4%	< 10% (after first week starting)
Repeatability on concentration results of benzene standard	2.14%	≤ 5%
Standard deviation on retention time of Benzene standard	1.364 s	< 2 s
RSD on retention time	1.27%	< 2%
Blank (NMTHC-EqC3)	0.109 ng	< 1 ng

Units:

a.u = area unit (signal unit)

This AirTOXIC analyser n° **#25860222** is in compliance with our quality control test CHROMATOTEC.**We remind you that is necessary to do preventive maintenance on analysers. Follow strictly the procedure of start and stop as explained in easy start document.****8 Comments related to analyser or / and programs**

- Supervisor MKIV with windows 10 embedded
- Our new standard power factor and "a" coefficient have been used for benzene during the quality control.
- Analyser works with corrected concentration of benzene in CALIB-30MN substance table in order to correct the BS due to the new formula of calculation in power.

QUALITY CONTROL ENGINEER
Carine GENESTE

ANALYTICAL DEPARTMENT MANAGER
Michel ROBERT
By Order: Damien BOURGAIN